HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	White River Hatchery
Species or Hatchery Stock:	Spring Chinook, White River
Agency/Operator:	Muckleshoot Indian Tribe
Watershed and Region:	Puyallup Basin, Puget Sound Region
Date Submitted:	
Date Last Updated:	**May 27, 2003**

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program. White River Hatchery

1.2) Species and population (or stock) under propagation, and ESA status.

1.3)

Spring chinook, *Oncorhynchus tshawytscha*, White River, Listed as Threatened (March 1999).

1.3) Responsible organization and individuals

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Name (and title): Richard Johnson
Agency or Tribe: Muckleshoot Tribe
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Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

Puyallup Tribe (Acclimation sites above Mud Mtn. Dam) and Washington Department of Fish and Wildlife (Minter Creek/Hupp Springs Hatchery)

1.4) Funding source, staffing level, and annual hatchery program operational costs.

Tribal/BIA – 4-15 staff – O&M – 325,000K

1.5) Location(s) of hatchery and associated facilities.

White River Hatchery is located on the White River (right bank) at River Mile 23.4 (10.0031), Puyallup River
Basin, Washington State.

Hupp Springs Rearing Station – Located on Minter Creek above the Minter Creek Hatchery (WDFW) entering Puget Sound in Henderson Inlet

Acclimation Sites (above Mud Mtn. Dam)

The Clearwater Rearing Pond is located at RM 3.2 on the Clearwater River(10.0080), Puyallup River Basin, Washington State.

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The Huckleberry Creek Rearing Pond is located at Mile 0.5 on Huckleberry Creek(10.0253), Puyallup
River basin, Washington State.
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The Cripple Creek Rearing Pond is located at Mile 0.25 on Cripple Creek(un-named seepage on West Fork White River 10.0186), Puyallup River basin, Washington State.
The acclimation ponds are associated facilities and not managed by the Tribe. For further information, refer to the HGMP for the White River Acclimation Sites prepared by the Puyallup Tribe of Indians.

1.6) Type of program.

Integrated Recovery

1.7) Purpose (Goal) of program.

The hatchery provides broodstock that will help contribute to recovery of White River natural origin recruits (NOR) as well as providing the opportunity for a viable and sustainable fishery on the White River sufficient to satisfy treaty obligations.

Note: Unless otherwise indicated in this document, the lower White River refers to that part of the river below Puget Sound Energy's (PSE) Diversion Dam at RM 23.4, and the upper White River refers to the White River and its tributaries located upstream of the PSE Diversion.

1.8) Justification for the program.

Without the hatchery program, it is very likely that the White River spring chinook stock would have already gone extinct.

1.9) List of program "Performance Standards".

Note: Performance Indicators in the table below are denoted by responsible entities as follows:

- * Muckleshoot Indian Tribe
- ** Other agencies
- *** Not currently funded

Performance standards and indicators for White River spring chinook

BENEFITS (Abundance and Recovery Goals)		
Goal (Section 1.7 – 1.8)	**Performance Standard (Section 1.9)**	**Performance Indicator (Section 1.10.1)**

Hatchery provides broodstock that will help contribute to the recovery of White River natural spawners	The number of tagged hatchery releases returning remains at or above target Level (see section 7.4.1)	***1)** Enumeration of tagged White River Hatchery fish in adult traps
	The survival of hatchery releases is adequate to provide broodstock needed each year	***2)** Estimate survival of hatchery onsite tagged releases
	The number of natural origin spawners increases over time consistent with the carrying capacity of the habitat.	***,**3)** Estimate the number of natural origin White River spring chinook adults at the trap (won't be able to differentiate NOR from all age classes of acclimation pond adults until 2004).
	The natural and acclimation origin returning adult chinook distribute to natural spawning areas in a similar manner in time and space	****4)** Estimate the numbers of marked and unmarked spawners on spawning grounds by origin and area

Muckleshoot Indian Tribe actions identified here are contingent upon annual appropriations.

RISKS (Evaluation of Genetic Hazards)		
Goal (Section 1.7 – 1.8)	**Performance Standard (Section 1.9)**	**Performance Indicator (Section 1.10.2)**
To minimize genetic damage to stock and to maintain the genetic integrity of the composite (hatchery + natural) stock	**Effective size depression** is minimized by maximizing effective population size	***5)** Estimate effective population size (formula)
		***6)** Use 1:1 mating protocol
	Domestication of hatchery release is minimized by maintaining life history traits within range of naturally produced spring chinook for juveniles and adults	***7)** Estimate life history trait distribution of hatchery origin (HOR) juveniles at release, including size and timing of release
		****8)** Estimate life history trait distribution of natural origin (NOR) juveniles
		****9)** Test hypothesis that trait distributions of HOR and NOR juveniles are not different
		*** 10)** Estimate life history trait distribution of HOR adults, including size, age, and timing of return
		** **11)** Estimate trait distribution of NOR adults at return to adult trap
		*** **12)** Test hypothesis that trait distributions of HOR and NOR returns are not different

	Domestication is minimized by incorporation of naturally produced spawners into broodstock	***,** 13)** Develop plan for incorporating NOR spawners into hatchery broodstock
	Among population diversity is maintained. The number of spawners from outside the Genetic Diversity Unit (GDU) remains below 1-2%	*** 14)** Estimate the proportion of total naturally spawning adults (hatchery or natural) that are from outside the GDU. Test the hypothesis that this proportion is not greater than 2%
	Straying of program fish comprise less than 2% of non – target populations	*** 15)** Estimate proportion of spawners in nearby hatcheries and spawning grounds that are of White River Hatchery origin

RISKS (Evaluation of Ecological Hazards)		
Goal (Section 1.7 – 1.8)	**Performance Standard (Section 1.9)**	**Performance Indicator (Section 1.10.2)**
To minimize ecological hazard to the naturally produced population; either through competition or predation	Size and timing of fingerling juvenile hatchery release are similar to the natural production to minimize predation effects	* 16)** Estimate size at release of hatchery fingerling releases
		* 17)** Document timing of onsite release of hatchery juveniles
		*** 18)** Estimate size and age at emigration of natural production and acclimation pond production
		*** 19)** Estimate timing of emigration of natural production and acclimation pond production
		*** 20)** Compare size and migration timing of hatchery releases to natural out-migration

1.10) List of program "Performance Indicators", designated by "benefits" and "risks."

1.10.1) "Performance Indicators" addressing benefits.

Note: Indicator Numbers Correspond to Indicators listed with Performance Standards

Performance Indicator Section 1.10.1	**Monitoring and Evaluation**	**Section 11.1.1**	
	Sampling Locations	**Sample Items**	**Assumptions and comments**
BENEFITS (Abundance and Recovery Goals)			
1) Estimate of tagged White River Hatchery fish in adult traps	Adult Trap	All fish are identified as to tag/clip status. All tagged fish are expanded to account for untagged fish. Remaining untagged and unmarked fish are assumed to be natural origin (NOR) White River spring chinook.	All hatchery onsite releases are tagged and acclimation pond fish clipped. Cannot account for production from other hatcheries and natural systems that do not have representative tag groups

2) Estimate survival of hatchery onsite tagged releases	Pre-terminal and terminal fisheries, adult trap and spawning grounds	Requires sampling in all fisheries and in hatchery and natural escapement for CWTs. Estimates of total harvest and escapement are needed for calculation of sample fractions.	Current marking strategy (CWT with no ad clip) will not provide complete estimate of survival until electronic sampling is used in all fisheries in which the stock is exploited.

3) Estimate the number of natural origin White River spring chinook adults at the trap	Adult Traps	All fish are identified as to tag/clip status. All tagged fish are expanded to account for untagged fish. Remaining untagged and unmarked fish are assumed to be natural origin (NOR) White River spring chinook.	All hatchery onsite releases are tagged and acclimation pond fish clipped. Cannot account for production from other hatcheries and natural systems that do not have representative tag groups.
4) Estimate the number of marked and unmarked spawners on spawning grounds by origin and area.	Spawning ground surveys in White River and tributaries above dam	For each spawning stratum (tributary, reach): Number of spawners by tag/mark status. Tags removed	A sample design that provides a representative sample by area and total combined spawners. Or a stratified design with separate samples in each

			stratum and estimates total spawners by stratum Future funding depending on appropriations. Agencies cooperate to complete surveys.

1.10.2) "Performance Indicators" addressing risks

Performance Indicator Section 1.10.2	**Sampling Locations**	**Sample Items**	**Assumptions and comments**
RISKS (Evaluation of Genetic Hazards)			
Effective size depression:			
5) Estimate effective population size.	Adult Trap	All fish are identified as to tag/clip status.	This indicator would be estimated indirectly by tracking numbers of NOR and HOR in the broodstock and adult return over time.
6) Use 1:1 mating protocol	Hatchery	Establish mating protocol and record compliance	
Domestication:			

7) Estimate life history trait distribution of hatchery origin (HOR) juveniles at release, including size and timing of release.	Hatchery and smolt trap	Lengths, scales for age composition and number by time period.	Collect information on size distribution of onsite releases when released. Collect information on ventrally clipped acclimation pond releases at the smolt trap below the dam or in the flume

Performance Indicator	**Sampling Locations**	**Sample Items**	**Assumptions and comments**
RISKS (Evaluation of Genetic Hazards)			
Domestication:			
8) Estimate life history trait distribution of natural origin (NOR) juveniles.	Smolt trap	Lengths, scales for age composition, and number by time period	Can separate hatchery from wild and spring from fall chinook. Future funding depending on appropriations Agencies cooperate in collection and analysis of data.

9) Test hypothesis that trait distributions of HOR and NOR juveniles are not different.	Hatchery and smolt trap	Length, age, and timing	Same as above
10) Estimate life history trait distribution of HOR adults, including size, age, and timing of return	Adult trap	Lengths, sex, scales for age composition, and number by time period.	Separate HOR onsite and acclimation pond releases using tags and ventral fin clips. Assume all untagged and unclipped fish are NOR from above dam. If all fish cannot be sampled, then a sample design with proportional or stratified sampling should be developed
11) Estimate trait distribution of NOR adults at return to adult traps.	Adult trap	Length, sex, scales for age composition, and number by time period.	Agencies cooperate in collection and analysis of data.
12) Test hypothesis that trait distributions of HOR and NOR returns are not different			Future funding depending on appropriations. Agencies cooperate in collection and analysis of data.
13) Develop plan for incorporating NOR spawners into hatchery broodstock			Plan is in development

14) Estimate the proportion of total naturally spawning adults (hatchery or natural) that are from outside the GDU. Test the hypothesis that this proportion is less than 2%.	Adult trap and spawning ground surveys	Tag/Mark status of all fish sampled in the trap or on the spawning grounds.	Requires a sample design for detecting non-local tags on spawning grounds which includes representative sampling of spawners and sample sizes sufficient to detect levels of contribution at 1-5% Future funding depending on appropriations Agencies cooperate in data collection and analysis
15) Estimate proportion of spawners in nearby hatcheries and spawning grounds that are of White River Hatchery origin	Voights Creek Hatchery and Puyallup River watershed fall chinook spawning grounds	All chinook in hatcheries and on spawning grounds for coded wire tags	Estimate stray rates of yearling and fingerlings separately. No bias in sampling spawning grounds. Funding for spawning ground surveys depending on future appropriations. Agencies cooperate in collecting data.

Performance Indicator	**Sampling Locations**	**Sample Items**	**Assumptions and comments**
RISKS (Evaluation of Ecological Hazards)			
16) Estimate size at release of hatchery fingerling releases	See section on domestication hazards above.		

17) document timing of onsite release of hatchery juveniles	See section on domestication hazards above.
18) Estimate size and age at emigration of natural production and acclimation pond production.	See section on domestication hazards above.
19) Estimate timing of emigration of natural production and acclimation pond production.	See section on domestication hazards above.
20) Compare size and migration timing of hatchery releases to natural outmigration	See section on domestication hazards above.

1.11) Expected size of program.

Production is based on current facility capacity and Recovery Plan for White River Spring Chinook Salmon (1996), to fully seed existing acclimation sites (830,000 fry) with the current on-station production at both Minter Creek/Hupp Springs and White River Hatchery (each producing 90,000 yearlings and 260,000 zero age smolts, respectively).
The Muckleshoot Indian Tribe reserves the right to discontinue current production; modify the current production level; or change species reared to meet the needs and policy direction of the Tribe.

1.11.1) Proposed annual broodstock collection levels (maximum number of adult fish).

The hatchery broodstock collection goal is 259 females and 441 males for a total of 700 spring chinook (the most recent 5 year history indicates that females average 37% of the total adult population). Any additional females would either be spawned or returned to the wild to spawn naturally.

1.11.2) Proposed annual fish release levels (maximum number) by life stage and

location.

Life Stage	Release Location	Annual Release Level
Fingerling	Acclimation ponds	250,000*
Fingerling	White River Hatchery	260,000
Yearling	White River Hatchery	90,000

See the Puyallup Tribe of Indian's GHMP for the White River Acclimation Ponds

1.12) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

Brood Year/ Group	Smolt to Adult Survival Rate	Adult Fishery Contribution Rate	Adult Hatchery Escapement Rate
1989 Fingerlings	.00049	.00017	.00038
1989 Yearlings	.00374	.00199	.00227
1990 Fingerlings	.00138	.00029	.00108
1990 Yearlings	.00254	.00103	.00151
1991 Fingerlings	.00123	.00023	.00100
1991 Yearlings	.01535	.00447	.01065
1992 Fingerlings	.00160	.00043	.00130
1992 Yearlings	.00389	.00188	.00196
1993 Fingerlings	.00299	.00052	.00167
1993 Yearlings	No data	no data	no data
1994 Fingerlings	.00184	.00038	.00096
1994 Yearlings	.00485	.00130	.00194
1995 Fingerlings	.00139	.00013	.00124
1995 Yearlings	.00565	.00178	.00381

Data Source: CRAS – Coded Wire Tag Retrieval and Analysis System
Northwest Indian Fisheries Commission
Internet: http://www.nwifc.wa.gov/enhance/cras.asp

1.13) Date program started (years in operation), or is expected to start.

White River Hatchery's first year of operation was 1989.

1.14) Expected duration of program.

Indefinite

1.15) Watersheds targeted by program.

Puyallup Basin WRIA 10

1.16) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

Assuming availability of eggs, an alternative to this program would be to identify other incubation and rearing facilities within the basin.
This alternative was rejected because alternative facilities are not available.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1) List all ESA permits or authorizations in hand for the hatchery program.

None at this time.

2.2) Provide descriptions, status, and projected take actions and levels for ESA-listed natural populations in the target area.

2.2.1) Description of ESA-listed salmonid population(s) affected by the program.

Puget Sound Chinook, threatened

Returning White River chinook adults enter river from May through mid-September. White River Chinook have historically spawned in upper White River tributaries: Clearwater River, Greenwater River and Huckleberry Creek (Salo and Jagielo, 1983). Fry emergence is thought to occur in late winter and early spring, after a short rearing period of 3 to 8 weeks the majority of fish migrate to marine waters (WDFW et al. 1996). Hatchery juvenile chinook releases coincide with the outmigration of natural origin chinook as evidenced by the simultaneous collections of both hatchery and natural smolts in the White River juvenile trap operated in 2000 and 2001 by WDFW. Age class structure and sex ratios have yet to be determined for natural origin adult chinook returning to the upper White River watershed. Scale sample collections in 2001 and 2002 will provide information on age structure. Results from the 1998 DNA sampling of returning natural origin adult chinook at the ACOE fish trap indicates a broad return timing of spring type chinook from May through October. Fall type fish arrived between mid August and October. It is unknown how the spring and Fall type fish segregate on the spawning ground or whether they are even reproductively isolated. DNA collections on the spawning grounds planned for 2001 and 2002 may provide some answers.

- **Identify the ESA-listed population(s) that will be directly affected by the program.**

Puget Sound Chinook, White River Spring Chinook

- Identify the ESA-listed population(s) that may be <u>incidentally</u> affected by the program.

Bull trout, Puget Sound chinook

2.2.2) <u>Status of ESA-listed salmonid population(s) affected by the program.</u>

- Describe the status of the listed natural population(s) relative to "critical" and "viable" population thresholds.

Critical and viable population thresholds have not been identified for this stock.

- **Provide the most recent 12 year (e.g. 1988-present) progeny-to-parent ratios, survival data by life-stage, or other measures of productivity for the listed population. Indicate the source of these data.**

Data is not currently available.

Provide the most recent 12 year (e.g. 1988-1999) annual spawning abundance estimates, or any other abundance information. Indicate the source of these data.

Numbers of untagged adult chinook returning to the Buckley trap and transported to upstream spawning grounds each year over the entire season. Data obtained from the ACOE Mud Mountain Dam Fish Haul Report. These numbers do not account for prespawn mortalities or adult chinook that do not go all the way to the trap and spawn in the White River below.

1972	392
1973	137
1974	388
1975	488
1976	229
1977	66
1978	140
1979	72
1980	61
1981	175
1982	20
1983	21
1984	7
1985	27
1986	6
1987	117
1988	127
1989	83
1990	275
1991	194
1992	406
1993	409
1994	392
1995	605
1996	628
1997	402
1998	316
1999	553
2000	1523
2001	2002

Table does not specify race. The composition of spring vs. fall chinook is unknown. Also, untagged fish may include a proportion of hatchery origin fish.

To the extent that spawning ground surveys are considered by the co-managers to be required to accurately assess the success of the White River spring chinook hatchery program, spawning surveys on that portion of the White River inclusive of the Muckleshoot Indian Reservation shall be undertaken by the Muckleshoot Indian Tribe in consultation the other co-managers.

Since 1997, WDFW has conducted redd counts on the Greenwater River (White River Tributary). The Puyallup Tribe has conducted redd counts on the Clearwater River and Boise Creek, and the Muckleshoot Tribe has conducted redd counts on Huckleberry Creek.

Return Year	Chinook hauled above MMD	Redd count on Greenwater R.	Redd count on Huckleberry C.	Redd count on Clearwater R.
1997	402	40	1	25
1998	316	31	0	18
1999	553	81	30	17
2000	1,523	76	58	80

2001	2,002	244	85	99

- **Provide the most recent 12 year (e.g. 1988-1999) estimates of annual proportions of direct hatchery-origin and listed natural-origin fish on natural spawning grounds, if known.**

Data is not presently available. Hatchery origin fish released in the upper White River were not 100% marked (ventral fin clipped) until 2000.

2.2.3) <u>Describe hatchery activities, including associated monitoring and evaluation and research programs, that may lead to the take of listed fish in the target area, and provide estimated annual levels of take</u>.

The White River hatchery spring Chinook is a listed stock. All hatchery operations have the potential for "take".

- **Describe hatchery activities that may lead to the take of listed salmonid populations in the target area, including how, where, and when the takes may occur, the risk potential for their occurrence, and the likely effects of the take**.
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Adult sampling at the ACOE fish trap has a potential to take listed chinook salmon. Sampling procedures which include taking fin tissue for DNA analysis, scales for age composition, and length measurements may lead to delayed mortality due to handling stress. The annual levels of take are unknown but thought to be very low based on past radio tracking information from chinook sampled at the ACOE trap and then followed upstream.

In March 2000, the Hupp Springs hatchery left-ventral fin clipped approximately 200,000 juveniles destined for Clearwater River Acclimation Pond. White River Hatchery left-ventral fin clipped 182,000 juveniles for rearing and release at Huckleberry Creek Acclimation Pond. All acclimation pond fish will continue to be ventral fin clipped annually in order to evaluate downstream survival of fish released from the ponds and assess their contribution to the total smolt and returning adult populations.

Mortality attributable to the ventral fin clip is highly variable and occasionally substantial (Pacific Salmon Commission, 1997). For this study, the ventral clip was found to be the only feasible alternative to the adipose fin clip or other types of body marks. Excessive mortality has not been observed to date in ventral fin clipped fish during the acclimation pond holding period. Checking all chinook for a ventral fin clip may also prolong adult sampling procedures at the ACOE and White River hatchery traps. However, this can be done very quickly while other sampling is being conducted and should not cause additional migrational delay, descaling, or other injury which would result in mortality.

Under the ESA threatened status, take would include broodstocking efforts occurring in May through late September. The first broodstock collection under ESA occurred in the year

2000.

Trapping and handling devices and methods that would occur from May through October may lead to injury to listed fish through descaling, delayed migration and spawning, or delayed mortality as a result of injury or increased susceptibility to predation.
Broodstock collection will take fish.

- **Provide information regarding past takes associated with the hatchery program, (if known) including numbers taken, and observed injury or mortality levels for listed fish**.
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Not Known
Puget Sound Chinook were listed in March 1999. First "take" under the Endangered Species Act would involve natural origin broodstock collections in 2003 and thereafter.

- Provide projected annual take levels for listed fish by life stage (juvenile and adult) quantified (to the extent feasible) by the type of take resulting from the hatchery program (e.g. capture, handling, tagging, injury, or lethal take).

Not known

- **Indicate contingency plans for addressing situations where take levels within a given year have exceeded, or are projected to exceed, take levels described in this plan for the program.**

Take level threshold not identified.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan (e.g. *Hood Canal Summer Chum Conservation Initiative*) or other regionally accepted policies (e.g. the NPPC *Annual Production Review* Report and Recommendations - NPPC document 99-15). Explain any proposed deviations from the plan or policies.

Puget Sound ESU-wide hatchery plan not fully developed yet.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

The Puget Sound Salmon Management Plan (PSSMP 1985) sets out the legal framework under which co-management of hatchery programs occurs. The Co-managers' Puget Sound Chinook

Harvest Management Plan (February 15, 2000) set out harvest management objectives for each listed population of Puget Sound chinook.

Program is currently following guidance from the White River Spring Chinook Recovery Plan (WDFW et al., 1996). The plan is managed by the South Sound Spring Chinook Technical Committee Members, comprised of tribal, state, and federal agency representation.

3.3) Relationship to harvest objectives.

In December 1998 and following, WDFW initiated periodic closures of the immature chinook recreational fishery, historically conducted during winter months in Puget Sound, which traditionally has impacted White River spring chinook returning to the Minter Creek facility. It is unknown how these closures affected White River spring chinook returning the White River Hatchery.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

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For past harvest rates based on recovered tag codes, see Attachment 2.

For the immediate short term, most of the harvest of White River spring chinook will continue to occur in the Puget Sound sport fishery and in Carr Inlet tribal net fisheries. Harvest will also occur in the Puyallup River incidental to sport and tribal net fisheries directed at fall chinook and coho fisheries within the Muckleshoot reservation.

In the long term, as run size increases, the Tribe expects to harvest White River spring chinook commercially in traditional net fisheries. Any harvest will begin at low levels and increase as the resource allows. The highest priority harvest activities will be ceremonial and subsistence fisheries.

3.4) Relationship to habitat protection and recovery strategies.

1. Blocked access to historic spawning grounds as result of two impassable dams on the White River. Puget Sound Energy's diversion dam and U.S. Army Corps. Of Engineer's Mud Mountain dam are located at RM 23.4 and RM 29.6, respectively.
2. Juvenile mortality associated downstream migrations. Structural modifications to Mud Mt. Dam in 1995 and Puget Sound Energy's construction of a new fish diversion screen system in the Lake Tapps flume are thought to have significantly reduced mortality.
3. Loss of habitat diversity related to flood control activities.
4. Slope instabilities from past timber harvest activities resulting in increased sediment loads.
5. Lack of riparian vegetation and large woody debris in stream.

3.5) Ecological interactions.

Salmonid and non-salmonid fishes that could negatively impact the program are: cutthroat trout, bull trout, coho salmon, and sculpins that prey on chinook, etc.

Salmonid and non-salmonid fishes that could be negatively impacted by the program are adult bull trout. Adult bull trout are thought to spawn from late August to mid-October. Bull trout have been observed spawning in Silver Spring and Camp Creek, both tributaries to the White River. Redd superimposition has been brought up as a possible concern due to temporal overlap during spawning (Gene Stagner comm. to South Sound Spring Chinook Technical Committee, Feb. 1999, USFWS (360) 753-9440). NOR coho could also be negatively impacted by hatchery chinook, especially the yearling released chinook. NOR chinook could also be negatively impacted by hatchery chinook by predation, competition, disease, etc. (BIA 1999).

Hatchery/natural mating interactions presumably occur currently from untagged acclimation site fish (hatchery origin) spawning with natural -origin fish passed above the PSE Diversion Dam. The genetic impact from these mating pairs is unknown.

Salmonid fishes that could positively impact the program are adult chinook, coho salmon, and steelhead, whose carcasses, after spawning, become food for young chinook either directly, or indirectly, from the aquatic insects that utilize the nutrients from decomposed salmon carcasses.

Non-salmonid fishes that could positively impact the program include larval or juvenile sculpins, dace, and shiners on which juvenile spring chinook would prey.

Other species that could be positively impacted by the program are various aquatic and terrestrial species that feed on adult and juvenile salmon (i.e. bears, bald eagles, coyotes, mink, otter, fisher, blue herons, etc.).

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

The White River hatchery uses both groundwater and surface water in its operations.
Six wells are available for supplying groundwater for fish rearing at the hatchery. Typically, 2 to 3 wells run simultaneously, providing approximately 800-1,100 gpm. Well water is passed through vertical packed columns before reaching the fish rearing areas which adds dissolved oxygen and strips nitrogen. Eggs, fry, and fingerlings receive first pass well water. Yearlings receive a combination of first pass and reuse water. Well water temperatures maintain a moderate range for the fish throughout their rearing in the hatchery.

Temperatures do not exceed 52 degrees Fahrenheit in the summer and do not fall below 40 degrees F. in winter.

Ground water samples from test wells dug before hatchery construction showed relatively high concentrations of iron (0.16 to 0.59 mg/l) and of other heavy metals such as manganese, aluminum, and copper. No recent testing has been done but the aquifer has undergone 12 years of flushing from the high rate of pumping and subsequent river recharge since the hatchery was built.

May through October, natal surface water collected from the White River is used for adult holding.
Due to the high turbidity of surface water there is a sediment removal system, consisting of two centrifugal vortex separators. River water temperatures at the hatchery intake range from the mid to upper 40's Fahrenheit in May to the low to mid 50's in August and back to the mid 40's by late October. Mid summer turbidities can exceed 600 Nephalometric Turbidity Units (NTU's) due to glacial runoff during periods of excessively warm weather. During moderate summer conditions, turbidities are generally less than 200 NTU's.

The constructed surface water intake is located ¼ mile upstream of the hatchery building. Two 18 " intake pipes are enclosed in a concrete box covered with wedge-wire screen that conforms to NMFS entrainment guidelines. Each of the intake pipes feeds into a concrete vault. One vault contains two 20 hp vertical turbine pumps, the other vault has only one pump with space for another in the future. Delivering approximately 1100 gpm, river pumps are run only during adult collection and the effects on out-migrating juveniles is thought to be minimal as most are believed to be absent in the vicinity of the pump intakes. River water is fed through a 24 inch PVC pipe to the head tank, then distributed to the raceways. The permanent surface water intake system has not been operational for 3 years due to bed-load movement covering the top of the intake screens. Attempts to correct the problem have not been successful. A temporary 30 hp
submersible pump has been providing surface water for holding adult chinook. The pump is placed inside an aluminum screened cage which conforms to NMFS entrainment guidelines. The cage is put into the river about 75 yards south of the head tank and water is pumped into the head tank through an 8 inch PVC pipe. The pump supplies 1100 to 1200 gpm. Centrifugal Vortex Separators are not functional with the temporary river pump system.

Well water and surface water withdrawals for the program are permitted by the Washington State Department of Ecology. The ground water permit was issued March 29, 1988 for 1,950 gpm. An additional 12 cfs surface water right was granted 4/3/90 to be used in conjunction with ground water for hatchery operation and domestic supply.

A National Pollution Discharge Elimination System (NPDES) permit has not been required for the hatchery since the facility's production does not exceed 20,000 pounds of fish per year or use 5,000 pounds of fish food per month. If criteria change and are otherwise applicable to the Tribal hatchery, then compliance with this process is expected.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or

effluent discharge.

Both the primary and temporary surface water intake systems comform with NMFS screening guidelines to minimize the risk of impingement of juvenile fish**.**

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Broodstock are collected at the White River Hatchery and the Army Corps of Engineers' (ACOE) trap at Buckley. These two traps are located on the White River at the Puget Sounds Energy's hydro project diversion dam at river mile 23.4.

The ACOE trap is located on the left bank of the river and consists primarily of the fish ladder, holding pool, and hopper. Up-stream bound fish are sorted to be transferred across the river to White River Hatchery or, loaded onto an ACOE tank truck for hauling and release above Mud Mountain Dam.

The Hatchery trap is located on the right bank of the river and consists of the fish ladder and holding area. The lower portion of the concrete ladder has 4 steps. The walls are 6 feet apart and14 feet high at the entrance. The fish enter the upper portion (holding area) of the ladder through an aluminum V-weir. The upper section is approximately 60 feet long by 8 feet wide. Adult fish are removed manually by crowding to the upper end of the holding area and lifting up with a dip net. Tagged fish are transported, in a tote with oxygen, to concrete raceways for ripening. Unmarked fish are either taken to the ACOE trap in a tote or picked up on site by the ACOE tank truck for hauling upriver.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

Hatchery origin fish (adults) are transported via a large tote supplied with supplemental oxygen. Untagged adults are transferred via 1,000 gallon tank truck equipped with supplemental oxygen transported approximately 10 miles upriver and released.

5.3) Broodstock holding and spawning facilities.

Broodstock is held in outdoor raceways partitioned by sex.

5.4) Incubation facilities.

The incubation room at White River Hatchery consists of 24-8 tray stacks of Heath shallow trays. Eggs are water hardened in the trays in a 100-PPM iodine solution for an hour as a general disinfection procedure. The incubation room receives only well water and is equipped with a local telephone dialer for water outages.

5.5) Rearing facilities.

Emergent fry are put into 11 feet long x 3 feet wide deep fiberglass tanks. There are 16 start tanks in the hatchery building, all supplied with pathogen free well water. Normal flow in each tank is 30 to 35 gpm, which provides approximately four turnovers per hour. Lighting is soft white florescent with ultraviolet blocking sleeves indoor lighting is the only illumination for fry rearing except when cleaning tanks. Dark plastic is used to filter the light coming in through the windows on excessively bright days. Juveniles are moved to outdoors concrete runways when they reach about 1.5 grams in weight.

5.6) Acclimation/release facilities.

Juveniles are reared in 4 – 95 feet by 8 feet outdoor raceways in the late winter through early summer. All fish are coded- wire tagged in May at a size of 3 to 4 grams. The zero-aged fish (260,000) are released from the hatchery in early June at 5 to 6 grams. The 90,00 fish reserved for the yearling program are moved from the raceways to a 94 feet by 52 feet concrete rearing pond in early summer. Both the raceways and rearing pond are covered with 2 inch mesh bird netting to keep out predators such as kingfishers and herons. Those fish not needed for the hatchery 'core program' are moved to upriver acclimation ponds in late March or early April at a size of 2 grams. There are three acclimation ponds, two of which are earthen, and one is concrete. Juveniles are released directly from the ponds in late May and early June.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

No significant losses have occurred.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

The Hatchery Supervisor and Assistant Supervisor live on site and the entire staff is linked via pager to the hatchery alarm dialer. The fire protection system is monitored around the clock by by contract security vendor. The hatchery possesses a 280 kW diesel generator, which is on continuous standby in case of electrical failure.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Natural spawners from the White River (Puyallup Basin). The broodstock and the hatchery stock are both listed as threatened as part of the Puget Sound chinook listing (64 FR 14308, March 24, 1999).

6.2) Supporting information.

6.2.1) History.

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Efforts to restore native spring chinook to the White River have occurred in the following stages.

(1971-72)
In 1971 male spring chinook were captured at Puget Power's diversion dam near Buckley. Male captures were hybridized with females from several other chinook stocks. This program was discontinued in 1972.

(1974-76)
Adults were collected at the Buckley trap for the 1974, 1975, and 1976 broods. Captured fish were spawned at Garrison Springs Hatchery near Tacoma and Puyallup Hatchery on Voights Creek, a Puyallup River tributary. Progeny of these spawnings were returned to the White River as fingerlings or smolts.

(1977- 1998)
Habitat and passage concerns spurred interest in developing an off-site eggbank program on

Minter Creek, at the Hupp Springs Hatchery. Hatchery construction was concluded in the late 1970's. Broodstock for the Hupp Spring facility was supplied through adult returns to the Buckley trap and a captive broodstock established at NMFS Manchester net pen complex. Since 1986 broodstock came exclusively through the captive broodstock. The Manchester captive broodstock operations were discontinued after the1986 brood. The program was replaced by a cooperative effort between Washington Department of Fish and Wildlife (WDFW) and Squaxin Island Tribe at the South Sound Net Pen Complex. Progeny from the SSNP and Minter Creek Hatchery were released solely in Minter Creek until 1990.

The program expanded in 1989 with transfer of excess progeny (from Minter Creek Hatchery) to the recently completed White River Hatchery. The addition of this facility doubled the program's size in terms of broodstock and releases.

Until 1998 eggs were supplied from three sources; captive broodstock from South Sound Net Pens and adult returns to Minter Creek and White River Hatcheries. Releases from Minter Creek and White River facilities include fingerling and yearling release groups. Excess progeny for the Minter Creek facility and South Sound Net Pens are transferred to the White River Hatchery and acclimation ponds above Mud Mt. Dam for direct release.
(WDFW et al. 1998)

1998 – present
Adult spring chinook returning to Minter Creek or White River Hatchery are used first to satisfy their respective hatchery broodstock needs with any surplus used to produce juveniles for transfer to acclimation ponds in the upper White River.

6.2.2) Annual size.

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Currently, only marked returns are used for broodstock.

6.2.3) Past and proposed level of natural fish in broodstock.

There were a total of 196 chinook taken from the ACOE fish trap for broodstock from 1977 through 1986 (WDFW Hatchery Division, Forms 152). These fish provided the egg bank for the current phase of artificial production. Future levels of natural broodstock incorporation into the hatchery stock has not been determined at this time.

6.2.4) Genetic or ecological differences. attributes

Changes in genetic or ecological attributes of White River spring chinook have not been substantiated .
Genetic analyses were conducted in 1991-1993. Samples were collected from spawners returning to Hupp Springs Hatchery (natural spawning surrogate) and from spawners available

from the South Sound Net Pens captive population. These facilities were broodstock sources prior the construction of the White River Hatchery. G-test comparisons showed no significant (P>0.05) allele frequency differences between the two groups. Comparisons between year to year differences were found to be significantly different, however, are likely to be the result of variability in breeding population sizes. Allele frequency comparisons were also conducted against other fall chinook baselines in Puget Sound, where significant allele frequency differences existed. (WDFW et al. 1996)

In June 1995, 101 subyearling chinook smolts were collected in the Lake Tapps Flume below Dingle Basin for genetics analysis. All of the typical alleles (based on the earlier Hupp Springs/ South Sound Net Pens analyses) were found including a particular allele found only in White River spring chinook (Ann Marshall, WDFW).

6.2.5) Reasons for choosing.

Indigenous stock.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

Only indigenous White River spring chinook salmon have been selected for original broodstock since the inception of the program.

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adults

7.2) Collection or sampling design.

Broodstock collection occurs at the White River Hatchery and Army Corps of Engineers' Buckley trap. The traps are located on the White River at RM 23.4 adjacent to Puget Sound Energy's hydro project diversion dam. The White River Hatchery trap is located on the right (north) bank of the river, and the ACOE trap is located on the left (south) bank.

The PSE diversion dam blocks all upstream fish migration. Therefore, 100% of the migrants are accessible from the two trapping facilities at the dam. Spring chinook begin arriving at the traps from mid to late May. Tribal hatchery staff collect fish from both traps three to five days a week, depending on return numbers, between mid May until late September or early October. Fish are dipnetted out of the traps and checked for a coded wire tag with a hand held wand. All chinook

having a tag are taken to the White River Hatchery for holding. Protocols for collecting Natural Origin Recruits (NOR) are being developed for the 2003 return year and beyond.

To the extent that the Muckleshoot Tribe participates in operations at the White River adult trapping sites, it shall assist other participating parties in the monitoring of chinook salmon at those facilities to estimate the number of tagged and/ or marked and untagged and/ or unmarked fish escaping to the river each year.

7.3) Identity.

Describe method for identifying (a) target population if more than one population may be present; and (b) hatchery origin fish from naturally spawned fish.

Coded Wire tags are read to identify White River Hatchery origin fish prior to spawning.

7.4) Proposed number to be collected:

7.4.1) Program goal:

The White River Hatchery has an eggtake goal of 700,000 to provide for the hatchery's core program (350,000 juveniles for on-station release and for a contribution of 250,000 juveniles to the upriver acclimation ponds). A total of 259 females would be needed (assuming an average fecundity of 3,200 eggs per female, and a 15% pre-spawning mortality) to achieve the program goal..

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

Year	Adults Females	Males	Jacks	Eggs	Juveniles
1996	255	669	69	332,300	304,900
1997	349	473	108	779,200	689,300
1998	160	294	23	454,300	408,500
1999	228	201	332	660,260	601,200
2000	112	628	79	329,600	297,300
2001	444	370	138	1,222,500	Unavailable

*Years 1991-95 broodstock are combined totals for Minter Creek, SSNP, and White River Hatchery facilities. Jack and male totals were not provided separately for these years . (WDFW et al. 1996)

*Years 1996-2001 broodstock are numbers of adult returns for White River Hatchery only.

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

All broodstock is utilized.

7.6) Fish transportation and holding methods.

Coded wire tagged spring chinook collected at the ACOE trap are transported to White River Hatchery, for holding, in a large fish tote supplied with supplemental oxygen. Prespawn adult holding occurs in 95 foot by 8 foot concrete raceways, where adults are partitioned by sex. Untagged adults are transported in a 1,000 gallon, oxygen equipped, tank truck. approximately 10 miles upriver, for release,

7.7) Describe fish health maintenance and sanitation procedures applied.

All adult fish are injected upon arrival at the hatchery with oxytetracycline for the control and prevention of furunculosis, which is caused by the bacterium Aeromonas salmonicida. Each adult female is also injected with erythromycin to prevent the vertical transmission of Renibacterium salmoninarum, causative agent of bacterial kidney disease (BKD). Additional injections of these antimicrobials are administered during the rearing period to maintain therapeutic levels of these drugs in the broodstock. Formalin is administered via flow-through treatments to control the development of external fungal infections. All females are tested for BKD using the indirect fluorescent antibody test at the time of spawning. The eggs of any moderate or highly infected fish are culled out. The eggs of a lightly infected female are used only for the zero-age release group to prevent the possibility of horizontal transmission of the disease during extended rearing. These procedures are consistent with the Northwest Indian Fisheries Commission's (NWIFC)
fish health guidelines.

7.8) Disposition of carcasses.

All spawned carcasses are buried . The fish have been administered antibiotics and consequently are not fit for streamside deposition.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Currently all unmarked fish returning to the traps are passed above Puget Sound Energy's Diversion Dam.

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

Ripe females and males are selected at random and paired in the order of selection. A small number of jacks are included in the spawning population to mimic that which would happen in nature.

8.2) Males.

A back-up male is used to guarantee fertilization but no male is used more than once as either primary or back-up male. Milt from the primary male is given 20 to 30 seconds of fertilization time with gentle stirring before the back up milt is added.

8.3) Fertilization.

The males' and females' vent area is wiped with a clean paper towel prior to gamete collection. The gametes are placed in individually labeled "zipper-lock" baggies and kept cool in an ice chest until fertilization occurs. The eggs from a single female are combined with milt from the primary and secondary (backup) male in a disinfected 2 gallon bucket. After fertilization is complete, the eggs are rinsed thoroughly and placed in a Heath Tray incubator where they will water harden for 1 hour in an 100 ppm iodophor solution.

Pathogen free well water is then supplied to the trays quickly flushing the iodophor.

8.4) Cryopreserved gametes.

Cryopreserved gametes not utilized in this program.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme.

Currently utilizing a one-to-one mating scheme.

SECTION 9. INCUBATION AND REARING -

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

9.1) Incubation:

9.1.1) Number of eggs taken and survival rates to eye-up and/or ponding.

Normal survival from green to the eyed-egg stage is 93%.

9.1.2) Cause for, and disposition of surplus egg takes.

Surplus eggs used for upriver acclimation sites.

9.1.3) Loading densities applied during incubation.

Eggs are loaded at approximately 3,000 eggs per Heath tray.

9.1.4) Incubation conditions.

When excess capacity exists, the top tray is left open for sediment catchment purposes. Well water is generally very clean. However, small rust particles may enter the top egg tray when an inactive well pump is exercised or brought on line. Well water enters the incubation stacks with temperature ranges of 42-52 degrees Fahrenheit. Dissolved oxygen concentrations range from 10-11 ppm. Flow rates are 3 to 4 gpm per 8 - tray stack of Heath Trays. Surface water is not used for egg incubation because of its occasional high turbidity.

9.1.5) Ponding.

Fry are allowed to button up completely before ponding. They generally have at least 1600 Cumulative Temperature Units when ponded. They have a mean weight of 1200 fpp and a mean length of 26 mm. Fry are involuntarily moved to start tanks from early December through late January.

9.1.6) Fish health maintenance and monitoring.

Formalin is used as an anti-fungal agent for eggs. It is injected into the water supply line for each stack at a concentration of 1667 ppm for 15 minutes every other day.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

Eggs are incubated with pathogen-free well water.

9.2) <u>Rearing</u>:

9.2.1) Provide survival rate data (*average program performance*) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Survival from eyed-egg to fry stage is 97%.Survival from initial ponding of fry until release as zero-age fingerlings is about 97%.

9.2.2) Density and loading criteria (goals and actual levels).

Maximum density thresholds are 0.5 lbs. fish/ft3 from initial ponding through grow-out. Loading values vary from less than 1 lb. per gal per minute at ponding (1200 fish/lb.) to 5 pounds per gallon per minute at release for the zero-aged fish (85 fish/lb.). The juveniles held over for additional rearing (yearlings) will have loadings of 1.5 lbs./ gal/min. initially (70 fish/lb.) to a maximum of 12 lbs./gal/min. (8 fish/lb.) at release.

9.2.3) Fish rearing conditions

Dissolved oxygen (DO), flow, and temperature measurements are taken at distribution tank (headtank). Raceways are monitored for DO and flow measurements. Effluent water is also measured for DO and temperature.

Juvenile rearing well water temperatures range 42-50 degrees Fahrenheit. The yearling program rearing pond temperatures can reach 52 degrees F. in summer months.

9.2.4) Indicate biweekly or monthly fish growth information (*average program performance*), including length, weight, and condition factor data collected during rearing, if available.

Fish per pound (fpp) and average length measurements are taken approximately every two weeks. Occasionally condition factor is calculated. The yearling program is fed for target growth weight where yearlings are set to reach 8 fpp by mid-April. At this weight, they are released.

9.2.5) Indicate monthly fish growth rate and energy reserve data (*average program performance*), if available.

White River Hatchery spring chinook increase their body weight by about 25% per week in their first month. Fish ponded in late December at 1200 fish per pound will reach 600 fish per pound by late January, 400 fish/lb. by late February, 200 fish/lb. by the end of March, and 100 fish/lb. by the beginning of May when the fish are coded wire tagged.

9.2.6) Indicate food type used, daily application schedule, feeding rate range (e.g. % B.W./day and lbs./gpm inflow), and estimates of total food conversion efficiency during rearing (*average program performance*).

Feed rations are based on fish size and water temperature. Initially, fry are fed once an hour, 8 hours a day, 7 days a week. At, fingerling size, the feeding frequency is decreased to 4 to 6 feedings per day. Sub-yearling fish will go onto 5 days per week feeding schedules with 2 to 3 feedings per day. Different feed formulations have been tried but the semi-moist diets appear to get the best results throughout all phases of fish development.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Each year, fish pathologists screen a representative number of adults returning to tribal hatcheries for pathogens that may be transmitted to the progeny. The exact number of fish to be tested from each stock is specified in the Co-managers Salmonid Control Policy. NWIFC Pathologists work with hatchery crews to help avoid pre-spawning mortality of brood fish to maximize fertilization and egg survival.

Preventative care is also promoted through routine juvenile fish health monitoring. Pathologists conduct fish health exams at each of the tribal hatcheries on a monthly basis from the time juveniles swim-up until they are released as smolts. Monthly monitoring exams include an evaluation of rearing conditions as well as lethal sampling of small numbers of juvenile fish to assess the health status of the population and to detect pathogens of concern. Results are reported to hatchery managers along with any recommendations for improving or maintaining fish health. Vaccine produced by the TFHP may used when appropriate to prevent the onset of two bacterial diseases (vibriosis or enteric redmouth disease). In the event of disease epizootics or elevated mortality in a stock, fish pathologists are available to diagnose problems and provide treatment recommendations. NWIFC Pathologists work with hatchery crews to ensure the proper use of drugs and chemicals for treatment. The entire health history for each hatchery stock is maintained in a relational database called AquaDoc.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Data not collected currently.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

Natural rearing methods are not applied at White River Hatchery.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

See HGMP, Section 8 (mating protocols) and Section 9 (incubation and rearing).

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10. 1) Proposed fish release levels.

Age Class	Maximum Number	Size (fpp)	Release Date	Location
Fingerling	Surplus	70-85	Early June	Acclimation sites
Fingerling	260,000	80-95	Early June	White R. Hatchery
Yearling	90,000	8	Mid-April	White R. Hatchery

10.2) Specific location(s) of proposed release(s)

Stream, river, or watercourse:

On-station releases
White River Hatchery- WRIA- 10.0031

Acclimation Sites
Clearwater Rearing Pond- WRIA- 10.0080Huckleberry Creek Rearing Pond- WRIA- 10.0255
Cripple Creek Rearing Pond- WRIA- 10.0086

Release point: See above
Major watershed: Puyallup River
Basin or Region: Puyallup River

10.3) Actual numbers and sizes of fish released by age class through the program.

See HGMP, Section 10.1.

Report generated from Northwest Indian Fisheries Commission's CRAS database
http://www.nwifc.wa.gov/CRAS.asp

10.4) Actual dates of release and description of release protocols.

See Section 10.1. Release protocols are as follows: Yearlings are released volitionally from the rearing pond beginning in early April. After leaving the pond, they descend the fishway and 2 sets of aluminum slotted weirs a total distance of about 600 feet to the river. The last of the yearlings are forced out of the pond in early May so that annual maintenance and cleaning can begin. In late May and early June, the fingerlings are transported from the raceways to the adult collection chamber in the lower fish ladder where they are free to out-migrate to the river.

10.5) Fish transportation procedures, if applicable.

Normally, juvenile fish destined for the acclimation ponds are transported by the Puyallup Tribe of Indians Fisheries Department. However, to the extent that fish produced at White River Hatchery are transported by the Muckleshoot Tribe, the fish are hauled in a 400 or 600 gallon tank, which is aerated and supplied with supplemental oxygen. Both containers are filled on-station with well water.

Length of transport time for juveniles from White River Hatchery to the acclimation sites range from 40 to 60 minutes. Adult transportation takes approximately 20-60 minutes to direct release sites.

Fish biomass limits for the 400 and 600 gallon tanks are 200 lbs. and 250 lbs. respectively. Loading densities don't exceed .5 lbs. per gal for both containers.

10.6) Acclimation procedures

Normally fish are transported to the acclimation ponds in end of March and released at the end of May through early June. Time/access restrictions exist at Clearwater and Cripple Creek acclimation sites posed by elevation and road access conditions.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

Hatchery production not marked, tag proportions provided below.

Group	# Rel'd	Date	#LB	BY	CWT	Remarks	No. tagged	% Tagged
						Rel'd at W.R. Hat. unless noted otherwise		
W.R.H	269394	6/2/90	113	89	21-18-45	Ad clip	241310	89.58%
W.R.H	95919	4/17/91	9	89	21-18-60	Ad clip	94768	98.80%
W.R.H	73923	6/28/91	124	90	21-20-44	Ad clip	70448	95.30%
W.R.H	37599	4/17/92	10	90	21-20-53	Ad clip	37599	100.00%
WDW	145952	5/27/92	89	91	21-22-45	Ad clip	141164	96.72%
WDW	39537	5/27/92	89	91	21-16-59	Ad clip	38231	96.70%
Keta	285672	5/27/92	78	91	21-22-46	Ad clip	138995	48.66%
W.R.H	237358	5/28/92	93	91	21-22-09	Ad clip	218484	92.05%
W.R.H	55761	4/12/93	9	91	21-22-63	Ad clip	55203	99.00%
W.R.H	249002	6/10/93	104	92	21-23-22	Ad clip	214640	86.20%
Keta	217807	6/10/93	104	92	21-23-21	Ad clip	167830	77.05%
Huck	142005	6/10/93	82	92	63-49-23	Ad clip	72041	50.73%
W.R.H	73226	4/13/94	13	92	21-20-48	Ad clip	71469	97.60%
W.R.H	242880	6/1/94	120	93	21-24-62	Ad clip	218349	89.90%
W.R.H	13213	6/1/94	120	93	21-25-09	Early release	12315	93.20%
Keta	165470	6/1/94	100	93	21-24-63	Ad clip	159348	96.30%
Cripple	114899	6/3/94	106	93	21-25-03	Ad clip	75866	66.03%
Huck	192478	6/10/94	110	93	LV clip	Unk. parentage	0	0.00%
W.R.H	39353	4/14/95	9	93	21-25-09	Ad clip	36677	93.20%
W.R.H	265078	6/5/95	130	94	21-26-05	Ad clip	229034	86.40%
Cripple	185795	6/15/09	104	94	No tag		0	0.00%
Huck	218631	7/26/95	80	94	No tag		0	0.00%
Hupp	99800	1/26/96	1200	95	No tag	GWTR R. (PTI)	0	0.00%
W.R.H	80427	4/15/96	10	94	21-29-19	Ad clip	74556	92.70%
Cripple	99980	5/1/96	200	95	63-58-49	Acc. pond	99980	100.00%
W.R.H	266021	5/30/96	79	95	21-29-40	Ad clip	252670	94.98%
W.R.H	83283	6/11/96	106	95	RV clip	GWTR R. (MIT)	0	0.00%
Huck	217450	6/13/96	130	95	No tag	Acc. pond	0	0.00%
Clrwtr	72600	6/13/96	72	95	63-58-49	Acc. Pond/ Ad clip	72600	100.00%
W.R.H	5433	2/6/97	1055	96	No tag	Pyramid Crk. (MIT)	0	0.00%
W.R.H	5117	2/6/97	1055	96	No tag	GWTR R. (MIT)	0	0.00%
W.R.H	5275	2/6/97	1055	96	No tag	GWTR R. (MIT)	0	0.00%
W.R.H	6870	2/26/97	687	96	No tag	Sil. Spr. Cr. (MIT)	0	0.00%
W.R.H	6870	2/26/97	687	96	No tag	Sil. Spr. Si. (MIT)	0	0.00%
W.R.H	3469	2/26/97	687	96	No tag	White R. (MIT)	0	0.00%
W.R.H	17312	2/26/97	687	96	No tag	White R. (MIT)	0	0.00%
W.R.H	34778	3/27/97	381	96	No tag	White R. (MIT)	0	0.00%
Hupp	25900	4/13/97	174	96	No tag	GWTR R. (WDFW)	0	0.00%
W.R.H	82860	4/15/97	7.5	95	21-29-41	Ad clip	75403	91.00%
Cripple	68000	4/29/97	191	96	No tag	Acc. pond	0	0.00%
Clrwtr	149980	5/3/97	104	96	No tag	Acc. pond	0	0.00%
Huck	189720	5/30/97	63.4	96	No tag	Acc. pond	0	0.00%
W.R.H	262087	6/5/97	82	96	21-29-42	Ad clip	250083	95.42%
W.R.H	3770	6/25/97	304	96	No tag	Acc. pond	0	0.00%

Group	# Rel'd	Date	#LB	BY	CWT	Remarks	No. tagged	% Tagged
						Rel'd at W.R. Hat. unless noted otherwise		
W.R.H.	82920	4/15/98	9	96	21-29-45	Ad clip	77696	93.70%
Cripple	20000	4/2/98	210	97	No tag	Acc. Pond	0	0.00%
Cripple	62530	5/22/98	117.5	97	No tag	Acc. Pond	0	0.00%
Cripple	22230	5/22/98	95	97	No tag	Acc. Pond	0	0.00%
Huck	175650	5/22/98	84.3	97	No tag	Acc. Pond (Hupp)	0	0.00%
Clrwtr	226500	5/22/98	83.5	97	No tag	Acc. Pond	0	0.00%
W.R.H.	278624	6/1/98	78	97	21-29-43	No clip	252712	90.70%
W.R.H.	88103	4/2/99	8	97	21-29-44	No clip	86077	97.79%
W.R.H.	274815	6/1/99	92	98	21-01-62	No clip	258051	93.90%
Clrwtr	32300	6/7/99	82	98	No tag	Acc. Pond	0	0.00%
W.R.H.	20989	4/14/00	6.4	98	21-01-63	No clip	19646	93.60%
W.R.H.	281799	5/25/00	84.5	99	21-01-80	No clip	269400	95.60%
Huck	182100	6/9/00	65.7	99	No tag	Acc. Pond/ LV clip	0	0.00%
Clrwtr	199598	6/9/00	71.3	99	No tag	Acc. Pond/ LV clip	0	0.00%
W.R.H.	6830	7/24/00	124	99	No tag	Ad/Lv clip	0	0.00%
W.R.H.	89939	4/1/01	6	99	21-01-81	No clip	82204	91.40%
W.R.H.	265264	5/25/01	64	2000	21-02-86	No clip	253592	95.60%
W.R.H.	6209	5/31/01	72	2000	21-28-39	Grnwtr R. (MIT) No Clip	5835	94.00%
W.R.H.	1716	5/31/01	72	2000	21-28-43	Grnwtr R. (MIT) No Clip	1639	95.50%
W.R.H.	6524	5/31/01	72	2000	21-28-45	Grnwtr R. (MIT) No Clip	6131	94.00%
Huck	121460	6/7/01	49	2000	No tag	Acc. Pond/ RV clip	0	0.00%
W.R.H.	88,517	4/12/02	7.5	2000	21-02-87	No clip	82852	93.60%
W.R.H.	261385	5/29/02	90.6	2001	21-04-03	No clip	232110	88.80%
Huck	496700	6/5/02	92	2001	No tag	Acc. Pond/ LV clip	0	0.00%
Clrwtr	237900	6/5/02	93.7	2001	No tag	Acc. Pond/ LV clip	0	0.00%
Cripple	135990	6/5/02	125	2001	No tag	Acc. Pond/ LV clip	0	0.00%
W.R.H.	26,400	6/24/02	61	2001	No tag	Ad clip	0	0.00%

Beginning in March of 2000 approximately 200K fish (acclimation pond destined) at both Hupp Springs and White River Hatchery will be ventral clipped. These marks will allow acclimation fish to be separated at impassable barriers on the White River.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

Surplus production is used for upriver acclimation sites.

10.9) Fish health certification procedures applied pre-release.

Monthly fish health monitoring exams, as described in section **9.2.7**, are conducted by a fish pathologist from the Northwest Indian Fisheries Commission up until the time of release. Fish are usually examined within 2 weeks of their scheduled release. The exam includes an assessment of mortality rate, fish behavior, general condition of the fish, and rearing conditions. A necropsy is performed on representative fish from the population, including moribund and dead fish if these are available. An attempt is made to determine factors contributing to mortality. Parasites are routinely screened for by microscopic examination of gills and skin scrapes. Bacterial or viral assays may be conducted at the discretion of the pathologist if there is evidence of an infectious disease problem. Depending upon the findings of the exam, a recommendation will be made to either release the fish as planned, or if necessary, to take appropriate management actions prior to release.

10.10) Emergency release procedures in response to flooding or water system failure.

Past flooding at the hatchery has resulted in sandbagging and has proven to be successful. (see previous section on natural events that can affect production…)

Water system failure is minimized by having multiple wells to supply a redundant source of water in case one or more well(s) fail(s).

In the event of an electrical failure the hatchery has a diesel generator on continuous stand-by.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

The extent of the interactions between hatchery releases and naturally reared smolts is unknown.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

White River Spring Chinook Recovery Plan Monitoring Tasks have been developed (see sections 1.10.1 and 1.10.2).

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

See Section 1.9

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

See Section 2.2.3 (pertaining to adult sampling).

SECTION 12. RESEARCH

Provide the following information for any research programs conducted in direct association with the hatchery program described in this HGMP. Provide sufficient detail to allow for the independent assessment of the effects of the research program on listed fish

12.1) Objective or purpose.

Unless prevented by exigent circumstances, the Tribe shall tag or mark all spring chinook salmon juveniles released through the hatchery program each year to allow monitoring and evaluation of juvenile out-migrants and adult returns, and to maintain separation during hatchery spawning between spring chinook and fall chinook stocks.

Marks and/ or tags applied should also allow for the differentiation of first generation acclimation pond-origin fish form spring chinook released directly from White River Hatchery. All on-station juvenile spring chinook releases have been coded wire tagged since 1990. Ventral fin clipping of the acclimation pond juveniles began in 2000.

12.2) Cooperating and funding agencies.

Muckleshoot Indian Tribe, Puyallup Tribe of Indians, and Washington Department of Fish and Wildlife.

12.3) Principle investigator or project supervisor and staff.

The above mentioned participants are cooperative investigators.

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.

Both the natural and the hatchery stock are listed as threatened.

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.

MS-222 anesthetized, and ventral fin clipped.

12.6) Dates or time period in which research activity occurs.

Fish will receive a ventral clip beginning in late March.

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.

Ventral clipping occurs on-station at White River Hatchery. Fish are crowded, and then captured via a dip net. Upon capture fish are transported to the marking trailer holding tank in a 5 gallon bucket. Fish densities in the holding tank do not exceed .5 lbs/gal. Handling time from when fish are captured to release back into the raceway does not exceed 1.5 hours.

12.8) Expected type and effects of take and potential for injury or mortality.

Direct mortality from specimen sampling and potential delayed mortality from clipping.

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 2).

Approximately 350K zero age spring chinook are coded wire tagged (no fin clip) and 250K zero age spring chinook are ventral fin clipped at White River Hatchery annually. Mortality associated with handling during tagging or clipping is unknown.

12.10) Alternative methods to achieve project objectives.

An alternative coded-wire body tag placed near the dorsal fin was tested on small non-listed hatchery fall chinook. This method was not successful due to poor retention and Injury to fish.

12.11) List species similar or related to the threatened species; provide number and causes

of mortality related to this research project.

No other salmonid species is affected by this research.

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.

Chinook inspected at adult and smolt traps for ventral fin clip will be handled with care and returned to the river as expeditiously as possible.

SECTION 13. ATTACHMENTS AND CITATIONS

CITATIONS:

Bureau of Indian Affairs. 1999. Biological Assessment for the Operation of Tribal Hatcheries Funded by the Bureau of Indian Affairs (with Emphasis on Chinook Salmon Funded by the Bureau of Indian Affairs With Emphasis on Chinook Salmon (*Oncorhyncus tshawytscha* of the Puget Sound). Northwest Indian Fisheries Commission, 6730 Martin Way E., Olympia, Washington 98516-5540.

Pacific Salmon Commission, 1997. An Update on the Implications of the Use of the Ventral Fin Clip as a Mass Mark for Coho Salmon.

Salo, Ernest O. and Thomas Jagielo. 1983. The Status of the Anadromous Fishes of The White-Puyallup River System. Report submitted to the Seattle District United States Army Corps of Engineers.

Washington Department of Fish and Wildlife, Puyallup Indian Tribe, and Muckleshoot Indian Tribe. 1996. Recovery Plan for White River Spring Chinook Salmon. Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091.

Washington Department of Fish and Wildlife, Puyallup Indian Tribe, and Muckleshoot Indian Tribe. 1998. Recovery Plan for White River Spring Chinook Salmon Update. Washington Department of Fish and Wildlife, 600 Capitol Way N., Olympia, WA 98501-1091.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973. By submitting this material, the Muckleshoot Tribe is not conceding the application of the ESA to its hatchery operations. This information is primarily submitted to facilitate the ability of NMFS to carry out its duties under the ESA consistent with the government to government relationship between the Muckleshoot Indian Tribe and the United States."

Name, Title, and Signature of Applicant:

Certified by_____ Date:_____

Table 2. Estimated listed salmonid take levels of by hatchery activity.

Listed species affected: ___spring chinook_____ ESU/Population:_Puget Sound/_White River_____ Activity:_____				
Location of hatchery activity:__Enumclaw, WA_____ Dates of activity:_____ Hatchery program operator:_Muckleshoot Indian Tribe_____				
Type of Take	**Annual Take of Listed Fish By Life Stage *(Number of Fish)***			
	Egg/Fry	Juvenile/Smolt	Adult	Carcass
Observe or harass a)	0	0	0	0
Collect for transport b)	0	0	Unknown*	0
Capture, handle, and release c)	0	0	Unknown*	0
Capture, handle, tag/mark/tissue sample, and release d)	0	0	0**	0
Removal (e.g. broodstock) e)	N/A	N/A	N/A	N/A
Intentional lethal take f)	N/A	N/A	N/A	N/A
Unintentional lethal take g)	***	****	*****	0
Other Take (specify) h)	N/A	N/A	N/A	N/A

a. Contact with listed fish through stream surveys, carcass and mark recovery projects, or migrational delay at weirs.
b. Take associated with weir or trapping operations where listed fish are captured and transported for release.
*Adult chinook are collected from the two traps at the Puget Sound Energy Diversion Dam at River Mile 24.3 (Corps of Engineers trap & haul on the left bank, White River Hatchery trap on the right bank). The Army Corps of Engineers is responsible for transporting non-coded wire tagged chinook upriver for release. A small mortality may occur due to predation while fish are entering or holding in the traps, and due to handling and hauling stress.
c. Take associated with weir or trapping operations where listed fish are captured, handled and released upstream or downstream.
* See b. above.
d. Take occurring due to tagging and/or bio-sampling of fish collected through trapping operations prior to upstream or downstream release, or through carcass recovery programs.
**Scale and fin tissue sampling for DNA analysis is done very quickly after chinook are lightly sedated.
Mortality has not been observed to date as a result of the aforementioned bio-sampling.
e. Listed fish removed from the wild and collected for use as broodstock.
f. Intentional mortality of listed fish, usually as a result of spawning as broodstock.
g. Unintentional mortality of listed fish, including loss of fish during transport or holding prior to spawning or prior to release into the wild, or, for integrated programs, mortalities during incubation and rearing.
*** Green to eyed egg mortality averages 7%. Eyed egg to swim-up fry mortality averages 3%.
**** Swim up fry to subyearling release mortality averages 3% (includes clipping/tagging mortality).

Typical rearing mortality of yearlings to release as smolts is 3%
***** Hatchery spring chinook adults are held for up to 4 months for ripening. Prespawning female mortality ranged from 2.7% to 21.8% (12.0% average) from 1997 through 2001.
h. Other takes not identified above as a category.

Instructions:

1. An entry for a fish to be taken should be in the take category that describes the greatest impact.
2. Each take to be entered in the table should be in one take category only (there should not be more than one entry for the same sampling event).
3. If an individual fish is to be taken more than once on separate occasions, each take must be entered in the take table.